1103-7

Fractional Flow Reserve After Stenting to Predict Need for Repeated Target Vessel Revascularization During Follow-Up

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Background: In-stent restenosis occurs in 10-15% of patients despite optimum angiographic results. Coronary pressure measurement has been suggested as an additional physiologic method to optimize stent deployment. Aim of the present study was to investigate the predictive value of pressure-derived fractional flow reserve (FFR), measured immediately after stenting, for repeated target vessel revascularization (TVR) at 6-month follow-up.
Methods: In 750 patients in 15 hospitals, stent implantation was guided by coronary pressure measurement and post-stent FFR was calculated as the ratio of hyperemic coronary pressure just distal and just proximal to the stented segment. Patients were divided in 5 groups, according to the post-stent FFR: 0.96-1.0; 0.91-0.95; 0.85-0.90; 0.81-0.85; and 0.75-0.80
Results: Baseline characteristics, procedural characteristics and angiographic results were completely comparable in all groups. But a strong inverse correlation was found between post-stent FFR and need for TVR and event rate at 6-month, ranging from 4% in patients with complete normalization of FFR after stenting to 36% in the worst group (table).
Conclusion: FFR after stent implantation is a strong independent parameter to predict need for target vessel revascularization (TVR) at 6-month follow-up. Complete normalization of FFR after stent implantation can be achieved in 50% of the patients and is associated with a 6-month restenosis rate of 4% only.

post-stent FFR	0.75-0.80	0.81-0.85	0.86-0.90	0.91-0.95	0.96-1.0	all patients
number of patients	36	43	117	230	324	750
refer diam (mm)	2.8±0.5	3.0±0.6	2.9±0.5	3.0±0.6	3.2±0.5	3.1±0.6
post-stent stenosis	12±9%	11±13%	10±10%	6±8%	8±10%	9±11%
TVR rate	37%	26%	18%	7%	4%	12%

1103-8

Three-Dimensional Relationship Between Peri-Stent Plaque and Neointimal Proliferation Throughout the Stented Segment: A Novel Intravascular Ultrasound Approach

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Background: Several 2-D IVUS studies of selected cross-sections have indicated that in-stent neointima tends to accumulate proportionally to peri-stent plaque distribution. The aim of this study was to use a newly developed algorithm to systematically evaluate this relationship in a 3-D perspective over the entire stented segment as well as to identify the possible determinants of the spatial correlation.
Methods: We analyzed 57 patients with 6-month IVUS after single balloon-expandable stent implantation. The contours of lumen, stent, and external elastic membrane (EEM) were extracted from the 3-D IVUS data set (echoPlaque™) at 1 mm intervals along the stented segment. Segments with moderate calcification were included, as long as the EEM border could be determined accurately. The contours were exported into custom-designed software to compute mean thickness of peri-stent plaque and neointimal hyperplasia within 12 equally-spaced sectors in each frame, as referenced from the stent center.
Results: A total of 173±8 sectors on 14.4±0.7 frames were examined per patient. Simple linear regression analysis of each patient showed a significant positive correlation (PC) between the mean thickness of peristent plaque and neointimal hyperplasia in 16 patients (28%). Total neointimal volumes were similar in PC (+) and PC (-) (34.5 ± 14.3 vs 37.1 ± 19.2 mm^3, p=ns). A multivariate logistic regression model including variables of clinical and lesion characteristics showed diabetes mellitus as an independent predictor of PC (+) (p=0.024, OR 6.39). On the other hand, presence of moderate calcium, defined as maximum calcium arc ≥45°, was significantly associated with PC (-) (p=0.038, OR 5.72).
Conclusions: 3-D IVUS analysis revealed a marked variability in correlation between underlying plaque burden and neointimal hyperplasia following stent implantation, which was significantly affected by both several clinical and lesion characteristics. These observations may provide important implications for optimal treatment strategies, including adjunctive approaches to reduce in-stent restenosis.

1103-9

Incidence of Stent Under-Deployment as a Cause of In-Stent Restenosis

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Background: Little data have been published concerning the importance of stent under-deployment (SU) as a contributing factor to in-stent restenosis. Moreover, it is unknown whether further PTCA improves stent deployment.
Methods: Fifty-nine patients with in-stent restenosis presenting for possible vascular brachytherapy (VBT) were evaluated by intravascular ultrasound (IVUS) prior to and after PTCA. Previously established criteria of stent deployment were applied and incidence of SU was calculated.
Conclusion: According to applied criteria, SU is detected in 20-40% of patients with in-stent restenosis referred for possible VBT. Following further IVUS-guided dilatation, stent deployment may be improved. The exact role of this improvement on restenosis recurrence remains to be determined.

Results

Criteria: Minimal Stent Cross Sectional Area (MSCSA)	Incidence Pre-	Incidence Post-	P
MSCSA ≤ 8mm2	69%	24%	0.0001
MSCSA ≤ 7mm2	61%	13%	0.0001
MSCSA ≤ 55% mean ref. EEM area	26%	24%	ns
MSCSA ≤ 80% mean ref. lumen area	21%	9%	0.057
MSCSA ≤ 90% mean ref. lumen area	39%	13%	0.0003
MCSA ≤ 90% min ref. lumen area	70%	7%	0.0001
MSCSA ≤ 100% min ref. lumen area	77%	11%	0.0001
MSCSA ≤ 90% distal ref. lumen area	21%	8%	0.052
MSCSA ≤ 100% distal ref. lumen area	30%	14%	0.03
Complete Apposition	97%	100%	ns
Symmetry Index	100%	100%	ns

1103-10

Myonecrosis Following Stent Placement: Association Between Impaired TIMI Myocardial Perfusion Grade (TMPG) and MRI Visualization of Microinfarction

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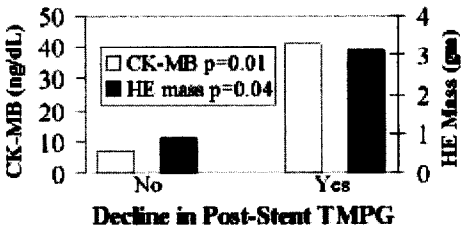
Background: Myonecrosis following coronary stenting appears as regions of hyperenhancement (HE) using contrast-enhanced MRI (ceMRI). We hypothesized that impaired tissue level perfusion using TIMI Myocardial Perfusion Grade (TMPG) following successful stenting is associated with the presence and degree of myonecrosis on ceMRI.
Methods: 14 patients without prior myocardial infarction underwent ceMRI after successful stenting; 9 had procedure-related CK-MB elevation and 5 served as CK-MB negative controls. TMPG was determined pre- and post stent by angiographers blinded to CK-MB and ceMRI findings.
Results: All 14 patients had target vessel TIMI grade 3 flow pre- and post-stent. TMPG was normal in 12/14 pre- and 7/14 post-stent. Post-stent TMPG <1 (minimal dye entry or stain of myocardium) in the target vessel or its side branch was more common in the group with CK-MB elevation and HE compared to controls (8/9, 88.9% vs. 1/5, 20.0%, p=0.02). A post-stent decline in target vessel TMPG was associated with greater CK-MB elevation and HE mass (see figure). More extensive myonecrosis (CK-MB > 3X normal, HE mass > 3 gm) was observed more frequently if there was a decline in target vessel TMPG post-stent (3/3, 100%, vs. 2/11, 18.2%, p=0.03).
Conclusions: These data provide further pathophysiologic evidence that CK-MB elevation following successful stent placement is associated with a decline in tissue level perfusion on angiography which is in turn associated with the magnitude of myonecrosis visualized on ceMRI.



1103-11

Early Lumen Loss After Treatment of Diffuse In-Stent Restenosis: After One-Hour Study Using Intracoronary Ultrasound

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Background: It has been shown that In-Stent restenosis (ISR) is dilated by combination of additional stent expansion and tissue extrusion outside the stent segment. However, significant lumen loss shortly after treatment of ISR has been demonstrated by intracoronary ultrasound (ICUS). **Methods:** Twelve diffuse ISR was studied. ICUS and Quantitative Coronary Angiography (QCA) was performed before, immediately after treatment, and 91±46 minutes later. ICUS and QCA analysis allowed measurements of stent, lumen, plaque burden, arterial areas. **Results:** as follows in table.
*Before PCI vs After PCI, †After PCI vs 91 minutes later, £ External Elastic Membrane Cross Section Area, The degree of early lumen loss was highly variable (mean 28±14%,